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IS : 9302 (Part IX/Sec 1) - 1980

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Indian Standard

CHARACTERISTICS AND METHODS OF MEASUREMENT FOR SOUND SYSTEM EQUIPMENT

PART IX PROGRAMME LEVEL METERS

Section 1 General

UDC 621·317·743:681·84

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Price Rs 5·00 Gr 2

April 1981

Indian Standard

CHARACTERISTICS AND METHODS OF MEASUREMENT FOR SOUND SYSTEM EQUIPMENT

PART IX PROGRAMME LEVEL METERS

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(*Continued on page* 2)

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Indian Standard

CHARACTERISTICS AND METHODS OF MEASUREMENT FOR SOUND SYSTEM EQUIPMENT

PART IX PROGRAMME LEVEL METERS

Section 1 General

0. FOREWORD

0.1 This Indian Standard (Part IX/Sec 1) was adodpted by the Indian Standards Institution on 27 October 1980, after the draft finalized by the Acoustics Sectional Committee had been approved by the Electronics and Telecommunication Division Council.

0.2 The purpose of this standard is to specify the characteristics and methods of measurement for programme level meters.

0.3 Different types of sound system equipment are being covered in a series of standards consisting of the following individual parts:

Part I	General
Part II	Amplifiers
Part III	Microphones
Part IV	Loudspeakers
Part V	Auxiliary passive elements
Part VI	Headphones
Part VII	Automatic gain control devices
Part VIII	Artificial reveberation, time delay and frequency shift equipment
Part IX	Programme level meters
Part X	Preferred matching values for the interconnection of sound system components

0.4 Different types of programme level meters are being covered in the following individual sections:

Section 1	General
Section 2	Peak programme meter, Type I
Section 3	Peak programme meter, Type II
Section 4	Volume indicator

0.5 While preparing this standard, assistance has been derived from IEC Pub 268-10:1976 'Sound system equipment Part 10: Programme level meters' issued by International Electrotechnical Commission.

0.6 The significant features of Type II instruments covered in IS:9302 (Part IX/Sec 3)*, which differ from those of Type I covered in IS:9302 (Part IX/Sec 2)†, are as follows:

a) The Type IIa instrument has a scale range of −20 dB to +4 dB with respect to reference indication (−21 dB to +3 dB for Type IIb instrument) and is normally viewed at close range. To ensure that consistant observations are made by all operators, having regard to the large resolution obtained, it is desirable to standardize the layout and dimensions of the scale and pointer [*see* Appendix B of IS: 9302 (Part IX/Sec 3)-1980‡].

b) The Type II instrument has an integration time of 10±2 ms.

c) The Type II instrument is used incidentally for line-up procedures employing tone at several amplitudes other than reference voltage. This is facilitated by the large resolution obtained by virtue of the relatively short scale range and the application of tight tolerances not only at reference indication but over most of the scale.

d) The use of a short scale range and a simple moving-coil meter encourages the design of inexpensive instruments having a variety of circuit arrangements. It is, therefore, particularly necessary to include tests which guard against spurious responses which could lead to discrepancies between the readings obtained from dissimilar instruments.

0.7 In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS:2-1960§.

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*Characteristics and methods of measurement for sound system equipment: Part IX Programme level meter, Section 3 Peak programme meter, Type II.

†Characteristics and methods of measurement for sound system equipment: Part IX Programme level meters, Section 2 Peak programme meters, Type I.

‡Characteristics and methods of measurements for sound system equipment: Part IX Programme level meters, Section 3 Peak programme meters, Type II.

§Rules for rounding off numerical values (*revised*).

1. SCOPE

1.1 This standard (Part IX/Sec 1) specifies the characteristics and the methods of measurement for programme level meters.

2. TERMINOLOGY AND EXPLANATION OF TERMS

2.0 For the purpose of this standard, the terms and definitions given in IS: 1885 (Part III)* and IS:9302 (Part I)-1979† shall apply in addition to the following.

2.1 Reference Indication — An indication corresponding to the maximum permitted programme level on the circuit to which the meter is connected (normally marked 100 or 0, referring to percentage, decibels, volume units, etc).

NOTE — The reference indication is not inherently associated with any particular programme level.

2.2 Reference Voltage — The rms value of a steady-state sinusoidal voltage of 1 000 Hz, which results in reference indication.

2.3 Division of the Scale — The graph showing the relation between input level and the deflection of the pointer. Unless otherwise specified, the curve shall refer to a sinusoidal test signal of 1 000 Hz.

2.4 Amplitude-Frequency Response — The difference, expressed in decibels is between the indicated level and the input level as a function of frequency, referred to the value at a specified frequency, preferably 1 000 Hz. Unless otherwise stated, the amplitude-frequency response is specified at reference indication.

2.5 Effective Frequency Range — The frequency range which the manufacturer has assigned to the instrument. The deviation from the flat amplitude-frequency response over this range should not exceed specified limits.

2.6 Dynamic Response — The graph or table showing the relation between different durations of a burst of sinusoidal voltage of 5 000 Hz, resulting in reference indication if applied continuously, and the corresponding deflections of the pointer.

2.7 Integration Time — The duration of a burst of sinusoidal voltage of 5 000 Hz at reference level, which results in an indication 2 dB below reference indication.

2.8 Delay Time — The time interval between the application of the reference voltage to the input and the moment when the pointer passes a point 1 dB below reference indication.

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*Electrotechnical vocabulary: Part III Acoustics.

†Characteristics and methods of measurements for sound system equipment: Part I General.

2.9 Overswing (Overshoot) — The transitory excess of deflection after a 1 000 Hz input signal ultimately resulting in reference indication has been applied.

2.10 Return Time — The time interval between the removal of a steady-state input signal (corresponding to reference indication, unless otherwise specified) and the moment when the pointer passes a specified lower point of the scale.

NOTE — If the meter is provided with a special device for obtaining a holding time, this holding time is considered to be included in the return time. The holding time should be stated by the manufacturer.

2.11 Reversibility Error — The difference in level indication when reversing the polarity of a specified asymmetrical signal.

2.12 Input Impedance — The internal impedance of the programme level meter, measured between the input terminals at reference indication at all frequencies within the effective frequency range, unless otherwise stated.

NOTE — If the value of the input impedance varies significantly with change in input voltage and/or frequency, the lowest value occurring within the effective frequency range should additionally be stated by the manufacturer.

2.13 Distortion Introduced by the Programme Level Meter — The total harmonic distortion introduced by the meter into a circuit of a specified impedance to which the meter is connected.

2.14 Temperature Range — The ambient temperature range within which the indication (corresponding to the reference voltage, unless otherwise stated) does not change by more than specified amounts, and within which the other characteristics of the meter are not subject to significant variations.

2.15 Overload Input Level — The maximum level of a sinusoidal input signal which the programme level meter is capable of withstanding for a specified time interval without damage or effect on the calibration.

2.16 Rated Equivalent Source emf for External Magnetic Fields of Power Supply Frequency — For a sinusoidal external magnetic field, specified as to rms value, frequency and direction, the equivalent source emf of reference frequency, corresponding to the indication due to the external magnetic field, for the programme level meter under rated conditions, in the absence of the source emf.

NOTE 1 — The equivalent source emf should be stated for the direction of the external field for which maximum influence occurs. The directions for both maximum and minimum influence should be stated.

NOTE 2 — The equivalent source emf should be given for an external magnetic field of power-supply frequency and for each of its harmonics up to and including the fifth.

NOTE 3 — The equivalent source emf should be given unweighted.

2.17 Supply Voltage Range — The supply voltage range within which the indications corresponding to input voltages over a specified range do not change by more than specified amounts, and within which the other characteristics of the meter are not subject to significant variations.

This relates only to programme level meters containing amplifiers.

3. CONDITIONS FOR MEASUREMENT

3.1 General Conditions

3.1.1 The general conditions for measurement shall be in accordance with **3** of IS:9302 (Part I)-1979*.

3.2 Rated Conditions and Normal Working Conditions

3.2.1 Provisions of **4** of IS:9302 (Part II)-1979† shall apply.

4. TESTS

4.1 Dynamic Response

4.1.1 The amplifier, if any, of the programme meter is connected as for rated conditions.

4.1.2 The amplitude of a sinusoidal source emf of 5 000 Hz is adjusted to give reference indication. The steady-state source emf is replaced by tone bursts of the same waveform, frequency and amplitude. Different durations of tone burst, which can be measured by means of a suitable counter or oscilloscope, are plotted against the corresponding maximum indications. The interval between the tone bursts shall be long enough and the noise level low enough to allow the meter to reach its zero signal condition.

4.2 Integration Time

4.2.1 The amplifier, if any, of the programme meter is connected as for rated conditions.

4.2.2 The method of measurement given in **4.1.2** shall apply.

4.2.3 The duration of the tone bursts is adjusted until the maximum indication of the pointer reaches the specified indication below reference indication. This duration is equal to the integration time.

4.3 Delay Time

4.3.1 Precise measurement requires the use of elaborate measuring equipment such as a triggered stroboscope. Since in practice, however, the delay time may be several hundred milliseconds, it is feasible to ascertain that the maximum permitted delay time is not exceeded by the use of a stop-watch and visual inspection.

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*Characteristics and methods of measurements for sound system equipment: Part I General.

†Characteristics and methods of measurements for sound system equipment: Part II Amplifiers (*Superseding* IS:1302-1958).

4.4 Overswing

4.4.1 The amplifier, if any, of the programme meter is connected as for rated conditions.

4.4.2 A sinusoidal source emf of 1 000 Hz, adjusted to give reference indication, is applied. The maximum of the transitory excess of deflection is observed.

4.5 Reversibility Error

4.5.1 The amplifier, if any, of the programme meter is connected for rated conditions.

4.5.2 The amplitude of a sinusoidal source emf is adjusted to give reference indication.

4.5.3 The input signal is asymmetrically clipped so that the peaks of the halfwaves of one polarity are reduced to 25 percent of their original value.

4.5.4 The dc component removed and the reading noted. The polarity of the asymmetrical signal is inverted. The reading is again noted.

4.5.5 The level difference between the two readings is the reversibility error.

4.6 Rated Equivalent Source emf for External Magnetic Fields of Power Supply Frequency

4.6.1 The amplifier is connected and adjusted as for rated conditions in the absence of the source emf.

4.6.2 An external uniform sinusoidal magnetic field of power supply frequency is applied. The direction of the external field shall be such that maximum indication is obtained.

NOTE — For the method of producing a uniform alternating magnetic field, *see* 4 of IS:9302 (Part I)-1979*.

4.6.3 The magnetic field strength H is measured and the corresponding indication is read off.

4.6.4 The equivalent source emf E'_s is computed (*see* **2.3**). E'_s is specified together with the value and direction of the magnetic field.

4.6.5 A test is made to obtain the direction of the magnetic field for minimum influence. This direction is also specified.

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*Characteristics and methods of measurement for sound system equipment: Part I General.

INDIAN STANDARDS ON ACOUSTICS

IS:

1301-1958	Code of safety requirements for electric mains-operated audio amplifiers
1490-1959	Recommendations for minimum performance requirements of mains-operated public address amplifiers
1819-1961	Recommendations for general requirements of public address amplifiers
1881-1961	Code of practice for installation of indoor amplifying and sound distribution systems
1882-1962	Code of practice for outdoor Installation of public address system
1885	Electrotechnical vocabulary:
(Part III/Sec 1)-1965	Physical acoustics
(Part III/Sec 2)-1966	Acoustical and electro-acoustical systems
(Part III/Sec 4)-1966	Sonics, ultrasonics and underwater acoustics
(Part III/Sec 5)-1966	Speech and hearing
(Part III/Sec 6)-1967	Acoustical instruments
(Part III/Sec 7)-1978	Music
(Part III/Sec 8)-1974	Architectural acoustics
2032 (Part XII)-1969	Graphical symbols used in electro-technology: Part XII Electro-acoustic transducers and recording and reproducing systems
2264-1963	Preferred frequencies for acoustical measurements
2382-1970	Recommended mounting dimensions of loudspeakers (*first revision*)
3028-1965	Methods of measurements of noise emitted by motor vehicles
3641-1976	Methods of measurement on hearing aids (*first revision*)
3931-1966	Sound level meters for the measurement of noise emitted by motor vehicles
3932-1966	Sound level meters for general purpose use
4242-1967	Method of measurement of acoustical noise emitted by ballasts for gaseous discharge lamps
4406-1967	General requirements for hearing aids
4482-1967	Hearing aids
4755-1968	Reference zero for calibration of puretone audiometers
4758-1968	Methods of measurement of noise emitted by machines
6098-1971	Methods of measurement of airborne noise emitted by rotating electrical machinery
6229-1971	Method of measurement of the real-ear attenuation of ear protectors at threshold
6964-1973	Octave, half-octave and third-octave band filters for analysis of sound and vibrations
7136-1973	Megaphones
7194-1973	Assessment of noise exposure during work for hearing conservation purposes
7709-1975	Standard hydrophone
7741 (Part I)-1975	Specification for loudspeakers: Part I General requirements and tests (*Superseding* IS:1031-1967)
7741 (Part II)-1975	Specification for loudspeakers: Part II Direct radiator moving coil loudspeakers (*Superseding* IS:1033-1967)
7741 (Part III)-1975	Specification for loudspeakers: Part III Pressure unit operated horn loudspeakers (*Superseding* IS:1032-1957)

7741 (Part IV)-1977	Specification for loudspeakers: Part IV Loudspeakers for community radio receivers (*Superseding* IS:1034-1957)
8146-1976	Method of measurement of reverberation time in auditoria
8159-1976	Scales and sizes for plotting frequency characteristics and polar diagrams
8225-1976	Method of measurement of absorption coefficients in a reverberation room
9098-1979	Pure tone audiometers
9167-1979	Ear protectors
9302 (Part I)-1979	Characteristics and methods of measurement for sound system equipment: Part I General
9302 (Part II)-1979	Characteristics and methods of measurement for sound system equipment: Part II Amplifiers (*Superseding* IS:1302-1958)
9302 (Part III)-1979	Characteristics and methods of measurement for sound system equipment: Part III Microphones (*Superseding* IS:2748-1964)